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105501-1

SHAUGHNESSEY NO

REVIEW NO.

EEB REVIEW

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PETITION OR EXP. NO. \_\_\_\_\_

DATE OF SUBMISSION 5-31-88

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EEB ESTIMATED COMPLETION DATE 6-29-90

RD ACTION CODE/TYPE OF REVIEW 660

TYPE PRODUCT(S) Herbicide

DATA ACCESSION NO(S) 40640001,-2,-3,-4

PRODUCT MANAGER, NO. 74

PRODUCT NAME(S) Tebuthiuron

COMPANY NAME Eli Lilly

SUBMISSION PURPOSE Review residue monitoring studies  
submitted in response to Reg. Std.

SHAUGHNESSEY NO.

CHEMICAL

% A.I.

105501-1

Tebuthiuron

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

SUBJECT: Review of Tebuthiuron monitoring studies

FROM: James W. Akerman, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division (H7507C)

TO: Carol Peterson, Project Manager 74  
Reregistration Branch  
Special Review/Reregistration Division (H7508C)

EEB has evaluated the EFGWB review of the following four Tebuthiuron monitoring studies submitted by Eli Lilly in response to EEB Request. This data requirement is outlined as 70-1 in table A (generic data requirements for Tebuthiuron) on p. 55 of the Guidance for the Reregistration of Pesticide Products Containing Tebuthiuron as the Active Ingredient (July, 1987).

1) Study #RSB81-2, (70-1), Evaluation of Graslan (Tebuthiuron) for Possible Contamination of Catchments Following Application for Rangeland Brush Control, Experiment RSB81-2, Hondo, Texas, "Supplemental Report."  
MRID #406400-01 Date received by EFED: 2-6-90

2) Study #MDH80-9, (70-1), Sagebrush to Grass Conversion in Southwest Idaho Watershed Study with Tebuthiuron, "Supplemental Report."  
MRID #406400-02 Date received by EFED: 2-6-90

3) Study #RSB81-1, (70-1), Evaluation of Graslan (Tebuthiuron) for Possible Contamination of Catchments Following Application for Rangeland Brush Control, Experiment RSB81-1, Marietta, Oklahoma.  
MRID #406400-03 Date received by EFED: 2-6-90

4) Study #AL-81-09, (70-1), Creation of Brush Grass Mosaics in Arizona Chaparral Watershed Study with Tebuthiuron, "Supplemental Report."  
MRID #406400-04 Date received by EFED: 2-6-90

The review indicates that Tebuthiuron is "a persistent herbicide with a propensity for solubilizing in runoff water three years or longer after application," and that "Tebuthiuron is lost over time (3 years) such that the concentrations decrease to a very low level (0.003 ppm to undetectable). CONCENTRATIONS, residues may remain in soil

SYMBOL	7507C	H7507C					
SURNAME	WINNIK	Cover	Alan				
DATE	5-24-90	5/29/90	5/21/90				



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

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MRID #406400-03 Date received by EFED: 2-6-90
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MRID #406400-04 Date received by EFED: 2-6-90

The review indicates that Tebuthiuron is "a persistent herbicide with a propensity for solubilizing in runoff water three years or longer after application," and that "Tebuthiuron is lost over time (3 years) such that the concentrations decrease to a very low level (0.003 ppm to undetectable). However, residues may remain in soil surrounding the catchments, particularly the lower soil layers. Some pellets may not be carried to a catchment area by runoff."

The studies reported aquatic residues ranging from < 1 ppb (measured at the conclusion of the Texas study) up to 180 ppb measured on 5/5/81 in the Oklahoma study) and hydrosoil residues from < 50 ppb up to 140 ppb. The studies were performed utilizing various application rates (1-3 lb a.i./A) but these rates do not reflect the worst case. The maximum label rate for Tebuthiuron is 6 lb a.i./A. Corrected for the maximum label rate the minimum and maximum aquatic residues found in the studies would be < 6 ppb and 540 ppb, respectively. Using the same reasoning for hydrosoil values the Tebuthiuron residues ranged from < 150 ppb to 420 ppb. These values indicate that at the maximum application rate of 6 lb a.i./A Tebuthiuron is not expected to pose a hazard to aquatic organisms (lowest MATC value of >9.3, < 18 mg/L for Fathead minnow) assuming a maximum of one application per 3 years. With an EC<sub>50</sub> value of 49.6 ppb for Selenastrum capricornutum and expected aquatic residue values ranging from < 6 ppb to 540 ppb, Tebuthiuron is expected to pose unacceptable risk to aquatic plants. As such tier III testing will be required. It should be noted that the data derived from the four studies is not valid for multiple applications or multiple year use of Tebuthiuron since these application scenarios would increase the expected risks greatly.

If there are any questions regarding this review please contact Harry Winnik, EFED/EEB at 557-7463

attachments

Shaughnessy No.: 105501

Date Out of EAB MAR 20 1990

TO: Robert Taylor  
Product Manager # 25  
Registration Division (H7505C)

FROM: Thomas Dixon, Chief *Thomas E. Dixon*  
Pesticide Monitoring Program Section  
Environmental Fate and Groundwater Branch (H7507C)

THRU: Hank Jacoby, Chief *Hank Jacoby*  
Environmental Fate and Groundwater Branch  
Environmental Fate and Effects Division (H7507C)

Attached, please find the EAB review of...

Reg./File # : 105501

Chemical Name: Tebuthiuron

Type Product : Herbicide

Product Name : Graslan

Company Name : Eli Lilly

Purpose : Review four monitoring studies.

Date Received: 09/15/88

Action Code: 660

Date Completed: 01/02/90

EFGWB#: 80898

Deferrals to: ☒ Ecological Effects Branch, EFED  
☐ Science Intergration & Policy Staff, EFED  
☐ Residue Chemistry Branch, HED  
☐ Dietary Exposure Branch, HED  
☐ Toxicology Branch, HED

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## Review of Four Tebuthiuron Monitoring Studies

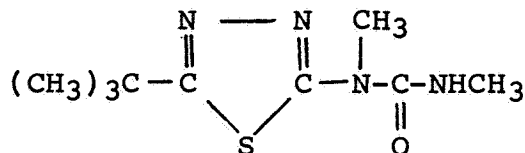
### 1. CHEMICAL:

Chemical Name: N-(5-(1,1-dimethyl)-1,2,4-thiadiazol-2yl)-  
N,N'-dimethylurea

Common Name: Tebuthiuron

Trade Name: GRASLAN

Structure:



2. TEST MATERIAL: Tebuthiuron (GRASLAN) 20% pellets

3. STUDY/ACTION TYPE: Review of four monitoring studies.

### 4. STUDY IDENTIFICATION:

- A. Evaluation of GRASLAN for Possible Contamination of Catchments Following Application for Rangeland Brush Control. Experiment No. RSB871-2, Hondo, TX.
- B. Sagebrush to Grass Conversion in Southwest Idaho Watershed Study with Tebuthiuron.
- C. Evaluation of GRASLAN for Possible Contamination of Catchments Following Application for Rangeland Brush Control at Marietta, OK.
- D. Creation of Brush Grass Mosaics in Arizona Chapperal Watershed Study with Tebuthiuron.

### 5. REVIEWED BY:

Harold R. Day  
Chemist  
Monitoring Section 6

9733 8/18/89

### 6. APPROVED BY:

Thomas Dixon, Chief  
Monitoring Section 6  
EF&G Branch, EFED (H5707C)

9 Jan 90

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## 7. CONCLUSIONS:

- a. These studies were done at various application rates (1-3 lb/A). The label directions call for as much as 4 lb/A. These studies do not reflect a worst case.
- b. These studies do not indicate what concentrations of tebuthiuron would be in water/soil if use was continuous (yearly). Since tebuthiuron has a long halflife, residues could easily build up over time. These studies are invalid for use of more than once a year or for multiple year use.
- c. The four studies show that tebuthiuron is lost over time (3 years) such that the concentrations decrease to a very low level (0.003 ppm to undetectable). However, residues may remain in soil surrounding the catchments, particularly the lower soil layers. Some pellets may not be carried to a catchment area by runoff.
- d. Tebuthiuron is a persistent herbicide with a propensity for solubilizing in runoff water three years or longer after application.
- e. Tebuthiuron in hydrosol was estimated to be about three times higher than in the water above it based on the tebuthiuron adsorption coefficient (Loh, 1981). This coefficient was used in the studies : instead of direct measurement because there is no consistent method to measure the tebuthiuron in hydrosol and because the detection limit for tebuthiuron in water (0.001 mg/l) is 50 times more sensitive than the detection limit for tebuthiuron in soil (0.05 mg/l).
- f. Tebuthiuron enters catchments via runoff following a single application. There the concentration of residues from a single application reaches a maximum of about 0.2 ppm in water shortly after application and decreases slowly over time to about 0.003 ppm or less after three years.
- g. These four reports do indicate relative concentration under field conditions, but were not at the maximum application rate, nor do they indicate concentrations from multiple applications.

## 8. RECOMMENDATIONS:

- a. These studies demonstrate the decline of tebuthiuron residues based on a "one time" use, however concern about the level of residues for multiple use during a season or for multiple year use are not answered. If more than one application is made, then more monitoring is needed.
- b. These monitoring studies do not indicate what the surface water concentrations would be at the maximum rate of 4 lb/acre.

## 9. BACKGROUND:

As stated in the Eli Lilly transmittal document, EPA requested additional tebuthiuron residue monitoring data for water and hydrosol at four study sites. This data requirement is outlined as 70-1 in Table A (Generic Data Requirements for Tebuthiuron) on p. 55 of the Guidance for the Reregistration of Pesticide Products Containing Tebuthiuron as the Active Ingredient (July, 1987). As directed in footnote 5 on p.55 of this document, the registrant is to extend the monitoring period at four sites, especially the Marietta, OK site.

There was a preliminary report reviewed on March 10, 1982 (EFB # 97) which provides detailed information on the study plans and the results. The review seems to indicate approval of the method/study. There are five sites mentioned in this report, four of which represent the inception of the studies in the latest submissions (1988).

According to the Registration Standard, tebuthiuron is considered a leacher (a threat to groundwater), and persistent (half life of one year). These monitoring data were submitted so EPA could determine the long term availability of the chemical for runoff to aquatic systems and the propensity for long-term buildup in the soil.

In an aerobic soil metabolism study, tebuthiuron formed only one significant degradate-a substituted aniline (designated CGA-62826). This degradate, formed from tebuthiuron after about 40 days, declined to 0.5% of the amount formed after one year.

Following is an evaluation of the submitted studies toward fulfillment of the "Special Studies Field Monitoring Requirement" (158.145):

### Study A

Tebuthiuron was applied to a 30 A watershed in Hondo, TX at the rate of 2 lb AI/acre (total 60 lbs AI). Following application, water and hydrosol were collected and analyzed for tebuthiuron. The experimental period was from 7/28/81 to 11/30/84.

### Study B

Tebuthiuron was applied in 20% pellet form at 1 lb AI/A to 98 acres of a 126 acre watershed in Idaho. Runoff from the area through a weir was monitored from the treatment date of 10/11/80 until 9/24/84.

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### Study C

Tebuthiuron 20% AI pellets were aerially applied to 11 acres of a 13 acre watershed near Marietta, OK on 4/4/81. Water and hydrosol were monitored until 11/7/84.

### Study D

Tebuthiuron as a 20% AI pellet was applied to 168 acres of a 303 acre watershed near Prescott, AZ on Feb. 18, 1981. Concentrations from a weir were monitored until 10/9/84.

### Summary of Experimental Details

<u>Item</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
State	Texas	Idaho	Oklahoma	Arizona
Application	aerial	unknown	aerial	unknown
Watershed (A)	29.8	126	13	303
Area applied (A)	28.9	98	11	168
Percent of area	97	78	85	55
Formulation AI	20%	20%	20%	20%
Form	pellet	pellet	pellet	pellet
Total AI/A	2	1	2	3
Total lbs. AI applied	57.8	98	22	504
Start (appl.)	7/28/81	10/11/80	4/4/81	2/18/81
End (monitor.)	11/30/84	9/24/84	11/7/84	10/9/84
Months(total)	40	45	42	43
Samples taken				
Pond	5	36	4	none
Hydrosol	4	3	3	none

## 10. DISCUSSION

### Study A-Texas

In this study, tebuthiuron was monitored in a catchment situated in a treated area. The highest concentrations in water (.07 ppm) were observed within six months of the treatment date. Tebuthiuron was undetected after three years.

Of the four hydrosol samples collected, only one (collected six months after the treatment) contained detectable tebuthiuron. The catchment contained a maximum of 0.1 % of the applied pesticide and declined to nondetectable after three years.

#### Comments:

1. From the photograph, it appears there is little slope to the land. Light runoff may evaporate before reaching the catchment from the surrounding treated area. It is however obvious that the catchment is the lowest point in the photograph.
2. The report (p.6-IV) states the rainfall to be 28 inches, but the recorded data over the three year monitoring period indicates the rainfall is about 16 inches per year.
3. On p. 14-Table I, the 11/29/83 sampling was added incorrectly. It should be 0.001% of applied ( $0.14 + 0.15/26241$ ), not 0.0006%.

### Study B-Idaho

In this study, tebuthiuron was added to a watershed area in Idaho to convert sagebrush to grassland. Most of the testing was directed toward measuring tebuthiuron content of runoff water through a weir. Limited sampling of the water and hydrosol in the pond at the test site was performed.

Of 36 samples taken at the pond, 25 were positive for tebuthiuron. The record of the pond water indicates concentrations of 0.001 to 0.002 ppm at intermittent times all the way up to the termination of the study in 1984. Nondetectable concentrations were found interspersed with the positive samples over the three year sampling period. All the hydrosol samples (3 taken in 1982-3) showed no tebuthiuron.

Comments:

1. The rainfall for the area is listed as 35 inches/year (page 6), but data over the test period indicates rainfall averaged 52 inches per year.
2. The data indicate a steady, but low concentration (.001-0.002 ppm), of tebuthiuron over the three year test period. This is true of the pond water and the runoff through the weirs.
3. It was very useful to have photographs of the test site, but it would be even better to also have a map showing the location of the test pond within the treated area, as well as contour lines showing the slopes. It is possible the pond may not have received a significant part of the runoff.
4. This treatment area represented a low application rate (1 lb/A). If higher rates were used, significantly more tebuthiuron would have been found.

Study C-Oklahoma

For this study area, pond water concentrations ranged from 0.18 ppm on 5/5/81 to a low of 0.003 ppm at the end of the study 11/7/84. A hydrosol sample taken 4 months after treatment contained 0.14 ppm tebuthiuron. Subsequent samples were undetectable or experienced interference problems with sulfur compounds. Water sampling indicates a slow but steady decline in tebuthiuron over the test period. Residues were still present after three years.

Comments:

1. The annual rainfall is listed as 36 inches/year: the data over the test period indicates this is within range. Rainfall from the time of application on 4/4/81 till the end of the year was abnormally high (44+ inches).
2. Tebuthiuron shows a gradual decline over time with significant declines after 6 months and again after two years.
3. The heavy rainfall after treatment of this area may have resulted in more than normal tebuthiuron reaching the catchment.
4. This study site had significantly more surface vegetation compared with other test sites.

Study D-Arizona

Tebuthiuron was applied to a watershed area in Arizona at a rate of 3 lbs/acre. Subsequent monitoring of the streams exiting the area showed an initial high concentration of 0.05 ppm one month after application and then decreasing, over a period of three years, to 0.005 ppm.

Comment:

This study confirms the previous studies in this review. It shows a slow, steady decline of residues over a period of three years from application to study termination. In this study, residues were still present in runoff water at the end of the study.

11. COMPLETION OF ONELINER: NA

12. CBI APPENDIX: NA